

Hazard Elimination Project Evaluation

Project Log # 200705259

Hazard Elimination Project W-3415

**Evaluation of the Realignments, Construction of Turn Lanes, and Traffic Signal Installation at
NC 62, SR 1001 (Union Ridge Rd), SR 1597 (Greenwood Dr),
SR 1730 (Carolina Rd), and SR 1600 (Glencoe St)
Alamance County**

Documents Prepared By:

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2/19/2008
Date

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Hazard Elimination Project Evaluation Documentation

Subject Location

Evaluation of Hazard Elimination Project W-3415 – NC 62, SR 1001 (Union Ridge Rd), SR 1597 (Greenwood Dr), SR 1730 (Carolina Rd), and SR 1600 (Glencoe St) north of Burlington in Alamance County.

Project Information and Background from the Project File Folder

There were multiple safety countermeasures chosen for the subject:

1. SR 1001 (Union Ridge Rd) was realigned to tee into NC 62 across from SR 1730 (Carolina Rd). In the before period SR 1001 formed a “Y” intersection with NC 62. This portion of SR 1001 was obliterated and abandoned. The portion of SR 1597 (Greenwood Dr) east of SR 1600 (Glencoe) was also abandoned to eliminate unnecessary intersections.
2. All approaches to the new intersection of NC 62 and SR 1001/SR 1730 were widened for left turns, with the SR 1001 approach also having a right turn lane.
3. A traffic signal was installed at the new intersection of NC 62 and SR 1001/SR 1730.
4. SR 1600 was realigned to tee into SR 1597, and SR 1597 was realigned for continuous approach to SR 1001.
5. Southbound NC 62 had poor site distance due to vertical alignment. As part of the project, the bank was cut back on the inside curve to improve site distance.

Please see attached *Collision Diagrams* and *aerial photos* for detailed visual depictions of the changes to the subject area.

With the realignments and abandonment of parts of SR 1597 and SR 1001, the three stop controlled intersections within 400 feet of each other in the before period (NC 62 and SR 1001, NC 62 and SR 1730/SR 1597, and SR 1001 and SR 1597) were reduced to only one signalized intersection (NC 62 and SR 1001/SR 1730), eliminating unnecessary conflict points.

Prior to the project all roadways had two-way, two-lane traffic patterns. NC 62 has a speed limit of 45 mph, while all other subject roadways have speed limits of 35 mph in the study area.

The initial crash analysis was conducted from February 28, 1993 through February 29, 1996 and included 48 crashes. Twenty-six of the crashes were considered correctable by a traffic signal.

The final completion date for the improvement at the subject intersection was on April 5, 1998 with a total cost of \$647,000.

Naive Before and After Analysis

After reviewing the hazard elimination project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from January 1, 1998 through June 30, 1998. The before period consisted of reported crashes from January 1, 1990 through December 31, 1997 (8 years) and the after period consisted of reported crashes from July 1, 1998 through June 30, 2005 (8 years). The beginning date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data includes all crashes within 150 feet of any of subject intersections. Please see attached *Location Map* for further details. Also see the attached *Collision Diagrams* for more detailed visual depiction of the crash data.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	99	17	-82.8
Total Severity Index	4.96	4.92	-0.8
Volume	7,900	9,500	20.3

<u>Injury Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Injury Crashes	53	9	-83.0
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	19	4	-78.9
Class C Crashes	34	5	-85.3
Property Damage Only (PDO) Crashes	46	8	-82.6

The naive before and after analysis at the subject intersection resulted in an 83 percent decrease in Total Crashes and a 20 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1993 and the after period ADT year was 2001.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in an 83 percent decrease in Total Crashes and a 1 percent decrease in the Total Severity Index. Class “B” and Class “C” Crashes had large decreases from the before to the after period (79% and 85%, respectively), while there were no Fatal or Class “A” Crashes in either period. Summary results above demonstrate that the treatment location appears to have had a decrease in Total Crashes from the before to the after period.

The calculated benefit to cost ratio for this project is 1.23 considering total crashes. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational

and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance costs.

As shown in the *Collision Diagrams*, there were multiple crash patterns in the before period. The most notable is at the four-leg intersection between NC 62 and SR 1730/SR 1597. Total Crashes at the intersection decreased by 76 percent from the before to the after period, from 59 to 14.

There are 39 Angle or Left Turn-Different Roadway crashes at this intersection involving southbound NC 62 vehicles and vehicles entering the intersection from either SR 1730 or SR 1597 (*Before Period Crash #s* 7 and 46 considered angle crashes). In the after period there are only 2 Angle Crashes at the intersection of NC 62 and SR 1730/SR 1001 that involve a southbound NC 62 vehicle, a decrease of 95 percent. This large decrease, in spite of the increase in ADT and consolidation of the three intersections into one, demonstrates that the cutting back of the bank on NC 62 and the installation of a traffic signal was very successful at reducing this crash pattern.

In the before period there were 13 Rear-End Crashes on SR 1001 at its intersection with NC 62. The yield condition of the intersection probably contributed to this crash pattern. This intersection was eliminated as part of the project.

In the before period there were 21 crashes at four-leg intersection of SR 1001 and SR 1597. This intersection was eliminated at part of the project. These crashes do not appear to have migrated by any significant means in the after period, as shown by the 76 percent decrease in crashes at the new intersection.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersections.

As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide more objective and definite information regarding actual crash reduction factors.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 62, SR 1001, SR 1597, SR 1730, SR 160
COUNTY: Alamance
FILE NO.: W-3415

BY: Brad Robinson
DATE: 2/12/2008

DETAILED COST: TYPE IMPROVEMENT - Realignments, Signal, Turn Lanes

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$647,000	10	0.149	\$96,422
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$647,000	10	0.149	\$96,422
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$3,200
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$900
TOTAL ANNUAL COST=	\$100,522
TOTAL COST OF PROJECT=	\$647,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	8.00	0	0.00	53	6.63	46	5.75	\$149,450
AFTER	8.00	0	0.00	9	1.13	8	1.00	\$25,475

Annual Benefits from Crash Cost Savings	\$123,975
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NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	\$23,453
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	1.23

TOTAL COST OF PROJECT	-	\$647,000	COMPREHENSIVE B/C RATIO	-	1.23
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Treatment Location: NC 62 and SR 1597 (Greenwood), SR 1730 (Carolina), SR 1001 (Union Ridge), and SR 1600 (Glencoe)

Treatment Location Configuration in Before Period



Treatment Location in After Period



Treatment Site Photos Taken February 4, 2008



Traveling North on NC 62 approaching SR 1001/SR 1730



Traveling North on NC 62 approaching SR 1001/SR 1730



Traveling North on NC 62 approaching SR 1001/SR 1730



Traveling South on NC 62 approaching SR 1001/SR 1730



Traveling South on NC 62 approaching SR 1001/SR 1730



Traveling South on NC 62 approaching SR 1001/SR 1730



Driving Northwest on SR 1730 (Carolina Rd) approaching NC 62



Driving Northwest on SR 1730 (Carolina Rd) approaching NC 62



Driving Southeast on SR 1001 (Union Ridge) approaching SR 1597 (Greenwood)



Driving Southeast on SR 1001 (Union Ridge) at SR 1597 (Greenwood), approaching NC 62



Driving Southeast on SR 1001 (Union Ridge) approaching NC 62



Driving Southeast on SR 1001 (Union Ridge) approaching NC 62



Driving East on SR 1597 (Greenwood) approaching SR 1600 (Glencoe)



Driving East on SR 1597 (Greenwood) approaching SR 1001 (Union Ridge)



Driving Northeast on SR 1600 (Glencoe) approaching SR 1597 (Greenwood)



On SR 1600 (Glencoe) looking at abandoned SR 1597 (Greenwood) alignment



On abandoned SR 1597 (Greenwood) alignment looking at old intersection with NC 62

